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SEPTEMBER 1990 MONTHLY GROUND WATER SAMPLING RESULTS LIVINGSTON RAIL YARD LIVINGSTON, MONTANA

Submitted to:

Montana Department of Health and Environmental Sciences
Cogswell Building
Helena, Montana 59620

Submitted by:

Burlington Northern Railroad Co.
9401 Indian Creek Parkway
Overland Park, Kansas 66201

Prepared by:

Envirocon, Inc.
101 International Way
P.O. Box 8243
Missoula, Montana 59807

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Submittal Date:

January 7, 1991

ENVIROCON, INC.

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1.0 INTRODUCTION

Burlington Northern Railroad Co., through its contractor Envirocon, Inc., took a total of 11 ground water samples on September 26, 1990. Six of the eleven samples were taken from six monitoring wells on and around the Livingston rail yard and two samples, one a duplicate, were taken from the B Street Municipal Water Well. Three quality control (QC) samples were taken, which included the B Street Municipal Water Well duplicate sample, one trip blank, and one equipment decontamination blank. In addition, one sample was taken from the outfall of Livingston's publicly owned treatment works (POTW).

Energy Laboratories, Inc. (ELI) in Billings, Montana analyzed eight of the samples for volatile organic compounds (VOCs) by EPA Method 524.2 and the other three were analyzed for purgeable halocarbons by EPA Method 601. ELI also analyzed three samples for total petroleum hydrocarbons (TPHs) by EPA Method 418.1. Table 1.0 summarizes sample and well numbers, sampling methods and dates, and analytical methods. Figure 1.0 shows the well locations and summarized analytical results. Appendix A contains complete laboratory analytical results.

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TABLE 1.0

CORRELATION OF WELL AND SAMPLE NUMBERS
SEPTEMBER 1990

SAMPLE NUMBER	WELL NUMBER	SAMPLE METHOD	SAMPLE DATE	ANALYTICAL METHOD*
140101-561	Trip Blank	-	9/26/90	524.2
140101-56[illegible]	LG-10	NDBP	9/26/90	524.2
140101-563	Equip. Blank	NDBP	9/26/90	524.2
140101-564	B Street	Tap	9/26/90	524.2; 418.1
140101-565	B Street Dup.	Tap	9/26/90	524.2; 418.1
140101-566	89-2	DBP	9/26/90	524.2
140101-56[illegible]	89-4	DBP	9/26/90	601
140101-568	POTW Outfall	Piped discharge	9/26/90	524.2; 418.1
140101-569	89-8	NDBP	9/26/90	601
140101-570	L-87-2	DBP	9/26/90	524.2
140101-571	89-3	DBP	9/26/90	601

NOTES:
* Refers to EPA analytical method
DBP - Dedicated bladder pump
NDBP - Non-dedicated bladder pump

2.0 RESULTS AND INTERPRETATIONS

The analytical results from most September sampling round locations are consistent with previous monthly results. There were no notable changes in chlorinated compound concentrations from August to September 1990. The analytical results from the B Street Municipal Water Well show no detectable VOC concentrations. This is consistent with previous monthly and quarterly analytical results.

3.0 QUALITY ASSURANCE/QUALITY CONTROL RESULTS

Envirocon followed the Quality Assurance/Quality Control Program, outlined in the Interim Remedial Measures Work Plan (Envirocon, April 1989), during the September 1990 sampling round.

3.1 Field Q/C

The trip blank analytical results show no detectable concentrations of Method 524.2 analytes, as shown in Appendix A. The equipment decontamination blank analysis indicated 8.4 parts per billion of chloroform. Low concentrations of chloroform are present in decontamination process water

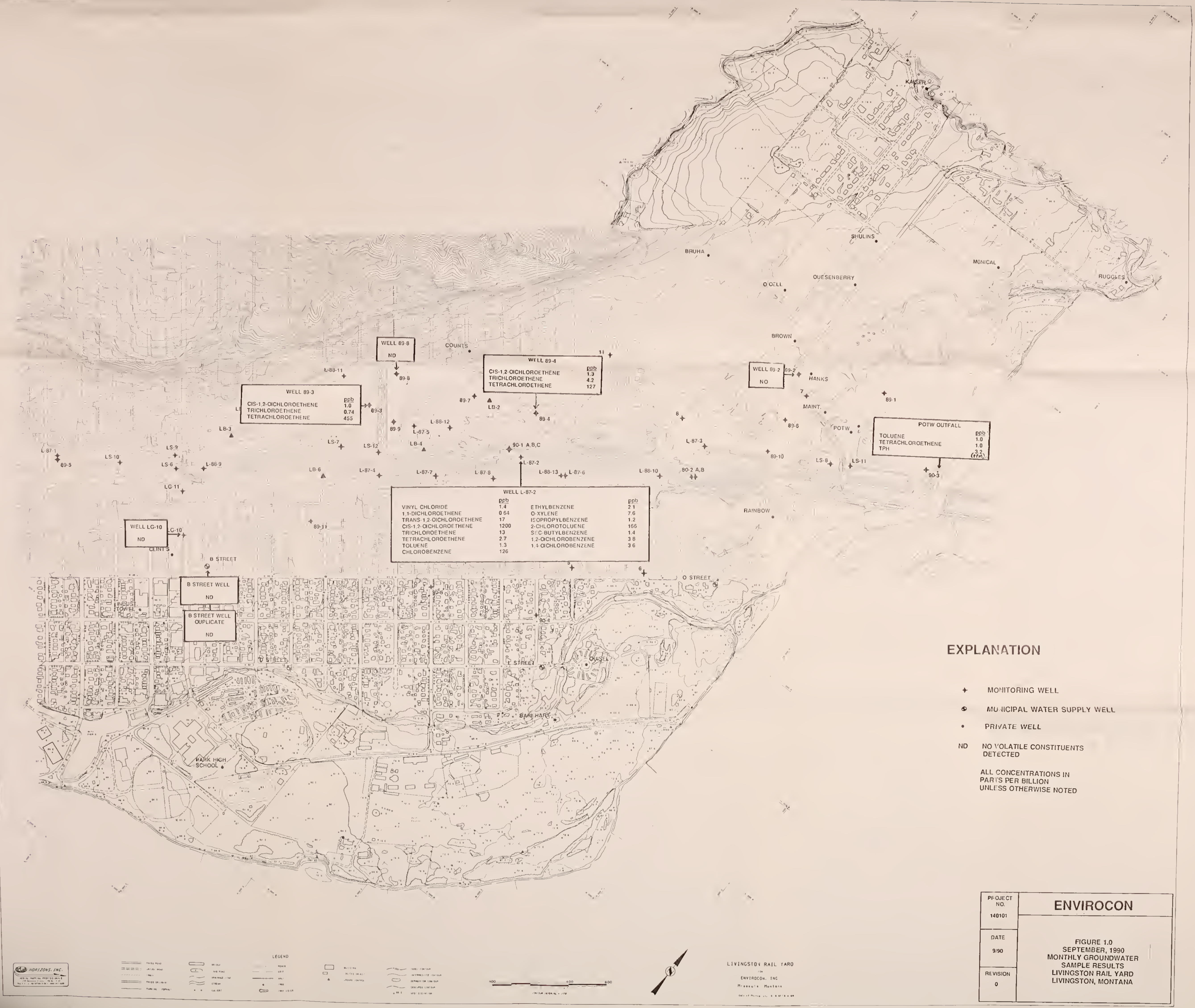
(tap and deionized); chloroform's presence does not indicate inadequate equipment decontamination.

The duplicate sample results from the B Street Municipal Water Well match results from the original B Street sample, as shown in Appendix A.

3.2 Laboratory QC

ELI conducted eight surrogate analyses, one spiked analysis, one reference sample, and one lab duplicate to validate laboratory procedures. As shown in Appendix A, all samples evaluated using percent recoveries were within recovery limits. The lab duplicate results match the original sample results.

FIGURE 1.0


KAISER
SHULINS
BRUHA
MONICAL
RUGGLES
O'DELL
QUESENBERRY
BROWN
HANKS
MAINT.
POTW
RAINBOW
COUNTS
CLINT'S
B STREET
O STREET
D STREET
L STREET
QUISEL
BARNHART
PARK HIGH SCHOOL
INDUST TOWEL
89-1
89-2
89-3
89-4
89-5
89-6
89-7
89-8
89-9
89-10
89-11
90-1 A,B,C
90-2 A,B
90-3
90-4
90-5
L-87-1
L-87-2
L-87-3
L-87-4
L-87-5
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L-88-11
L-88-12
L-88-13
LS-6
LS-7
LS-8
LS-9
LS-10
LS-11
LS-12
LB-2
LB-3
LB-4
LB-6
LG-10
LG-11
5
6
7
8
13
HORIZONS, INC.
LEGEND
LIVINGSTON RAIL YARD
for
ENVIROCON, INC
Missoula, Montana

WELL 89-8

ND

WELL 89-3

	ppb
CIS-1,2-DICHLOROETHENE	1.0
TRICHLOROETHENE	0.74
TETRACHLOROETHENE	455

WELL 89-4

	ppb
CIS-1,2-DICHLOROETHENE	1.3
TRICHLOROETHENE	4.2
TETRACHLOROETHENE	127

WELL 89-2

ND

POTW OUTFALL

	ppb
TOLUENE	1.0
TETRACHLOROETHENE	1.0
TPH	3.2 (ppm)

WELL LG-10

ND

WELL L-87-2

	ppb		ppb
VINYL CHLORIDE	1.4	ETHYLBENZENE	2 1
1,1-DICHLOROETHENE	0 64	O-XYLENE	7.6
TRANS-1,2-DICHLOROETHENE	17	ISOPROPYLBENZENE	1.2
CIS-1,2-DICHLOROETHENE	1200	2-CHLOROTOLUENE	166
TRICHLOROETHENE	13	SEC-BUTYLBENZENE	1.4
TETRACHLOROETHENE	2.7	1,2-DICHLOROBENZENE	3 8
TOLUENE	1.3	1,4-DICHLOROBENZENE	3 6
CHLOROBENZENE	126		

B STREET WELL

ND

B STREET WELL DUPLICATE

ND

EXPLANATION

✦	MONITORING WELL
⊕	MUNICIPAL WATER SUPPLY WELL
•	PRIVATE WELL
ND	NO VOLATILE CONSTITUENTS DETECTED

ALL CONCENTRATIONS IN
PARTS PER BILLION
UNLESS OTHERWISE NOTED

PROJECT NO. 140101	**ENVIROCON**
DATE 9/90	FIGURE 1.0 SEPTEMBER, 1990 MONTHLY GROUNDWATER SAMPLE RESULTS LIVINGSTON RAIL YARD LIVINGSTON, MONTANA
REVISION 0	

APPENDIX A
LABORATORY RESULTS

ENERGY
LABORATORIES

ENERGY LABORATORIES, INC.
P.O. BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325
FAX (406) 252-6069 • 1-800-873-5227

ENVIROCON
PO BOX 8243
MISSOULA MT 59807

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OCT 17 1990
ENVIROCON, Inc.
Livingston, Mt.

Water Analysis

PROJECT: Livingston / BN

LAB NO.	90-27216-17, 19
SAMPLE SUBMITTED	09/28/90
DATE REPORTED	10/15/90
SAMPLE DATE	09/26/90

Lab No.		Identification	Total Petroleum Hydrocarbons, mg/l
90-27216	B-STREET	140101-564 Sampled @ 1230	<0.1
90-27217	Dup of B-STREET	140101-565 Sampled @ 1230	<0.1
90-27219	POTW Outfall	140101-568 Sampled @ 1540	3.2

Q.A. Review: ____________________

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Livingston, Mt.

Water Analysis

PROJECT: Livingston / BN

PAGE 1

	POTW outfall	L-87-2	L-87-2 Lab dup Duplicate
LAB NO.	90-27219	90-27220	90-27220
SAMPLE IDENTIFICATION	140101-568	140101-570	140101-570
SAMPLE SUBMITTED	09/28/90	09/28/90	09/28/90
DATE REPORTED	10/15/90	10/15/90	10/15/90
SAMPLE DATE	09/26/90	09/26/90	09/26/90
SAMPLE TIME	1540	1746	1746
CONSTITUENT	ug/l	ug/l	ug/l
Dichlorodifluoromethane	<1.0	<1.0	<1.0
Chloromethane	<1.0	<1.0	<1.0
Vinyl chloride	<0.50	1.4	1.1
Bromomethane	<1.0	<1.0	<1.0
Chloroethane	<1.0	<1.0	<1.0
Trichlorofluoromethane	<1.0	<1.0	<1.0
1,1-Dichloroethene	<0.50	0.64	0.51
Methylene Chloride	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	<1.0	17	16
1,1-Dichloroethane	<1.0	<1.0	<1.0
2,2-Dichloropropane	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	1200	1200
Chloroform	<1.0	<1.0	<1.0
Bromochloromethane	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	<0.50	<0.50	<0.50
Carbon Tetrachloride	<0.50	<0.50	<0.50
1,1-Dichloropropene	<1.0	<1.0	<1.0
Benzene	<0.50	<0.50	<0.50
1,2-Dichloroethane	<0.50	<0.50	<0.50
Trichloroethene	<0.50	13	11
1,2-Dichloropropane	<1.0	<1.0	<1.0
Bromodichloromethane	<1.0	<1.0	<1.0
Dibromomethane	<1.0	<1.0	<1.0
Toluene	1.0	1.3	1.6
1,1,2-Trichloroethane	<1.0	<1.0	<1.0
Tetrachloroethene	1.0	2.7	2.1
1,3-Dichloropropane	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0
1,2-Dibromoethane	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	126	133
1,1,1,2-Tetrachloroethane	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	2.1	1.5
p-Xylene	<1.0	<1.0	<1.0
m-Xylene	<1.0	<1.0	<1.0

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MISSOULA MT 59807

Water Analysis

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PAGE 2

	POTW [illegible]	L-87-2 ✓	L-87-2 [illegible] Duplicate
LAB NO.	90-27219	90-27220	90-27220
SAMPLE IDENTIFICATION	140101-568	140101-570	140101-570
SAMPLE SUBMITTED	09/28/90	09/28/90	09/28/90
DATE REPORTED	10/15/90	10/15/90	10/15/90
SAMPLE DATE	09/26/90	09/26/90	09/26/90
SAMPLE TIME	1540	1746	1746
CONSTITUENT	ug/l	ug/l	ug/l
o-Xylene	<1.0	7.6	5.9
Styrene	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0
Isopropylbenzene	<1.0	1.2	1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0
1,2,3-Trichloropropane	<1.0	<1.0	<1.0
n-Propylbenzene	<1.0	<1.0	<1.0
2-Chlorotoluene	<1.0	166	171
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0
4-Chlorotoluene	<1.0	<1.0	<1.0
tert-Butylbenzene	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0
sec-Butylbenzene	<1.0	1.4	1.0
p-Isopropyltoluene	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	3.6	3.0
n-Butylbenzene	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	3.8	2.4
1,2-Dibromo-3-Chloropropane	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene	<1.0	<1.0	<1.0
Hexachlorobutadiene	<1.0	<1.0	<1.0
Naphthalene	<1.0	<1.0	<1.0
1,2,3-Trichlorobenzene	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0

REMARKS: Sample was properly preserved and in specified container. Sample was analyzed in accordance with EPA method 524.2.

Q.A. Review: Jon Shuler

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Water Analysis

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PAGE 1

	89-4	89-8	89-3
LAB NO.	90-27221	90-27222	90-27223
SAMPLE IDENTIFICATION	140101-567	140101-569	140101-571
SAMPLE SUBMITTED	09/28/90	09/28/90	09/28/90
DATE REPORTED	10/15/90	10/15/90	10/15/90
SAMPLE DATE	09/26/90	09/26/90	09/26/90
SAMPLE TIME	1515	1700	1845
Purgeable Organics EPA Method 601	ug/l	ug/l	ug/l
Bromodichloromethane	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0
Bromomethane	<1.0	<1.0	<1.0
Carbon tetrachloride	<0.50	<0.50	<0.50
Chlorobenzene	<1.0	<1.0	<1.0
Chloroethane	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	<1.0	<1.0	<1.0
2-Chlorotoluene	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0
Chloromethane	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	<0.50	<0.50
1,1-Dichloroethane	<1.0	<1.0	<1.0
1,2-Dichloroethane	<0.50	<0.50	<0.50
1,1-Dichloroethene	<0.50	<0.50	<0.50
cis-1,2-Dichloroethene	1.3	<1.0	1.0
trans-1,2-Dichloroethene	<1.0	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0

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MISSOULA MT 59807

Water Analysis

PROJECT: Livingston / BN

PAGE 2

	89-4	89-8	89-3
LAB NO.	90-27221	90-27222	90-27223
SAMPLE IDENTIFICATION	140101-567	140101-569 ✓	140101-571
SAMPLE SUBMITTED	09/28/90	09/28/90	09/28/90
DATE REPORTED	10/15/90	10/15/90	10/15/90
SAMPLE DATE	09/26/90	09/26/90	09/26/90
SAMPLE TIME	1515	1700	1845
Purgeable Organics EPA Method 601	ug/l	ug/l	ug/l
Methylene chloride	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0
Tetrachloroethene	127	<0.50	455
1,1,1-Trichloroethane	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	<1.0	<1.0	<1.0
Trichloroethene	4.2	<0.50	0.74
Trichlorofluoromethane	<1.0	<1.0	<1.0
Vinyl chloride	<0.50	<0.50	<0.50
Dichlorodifluoromethane	<1.0	<1.0	<1.0

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Water Analysis

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PAGE 1

	B-Street ✓	Dup 8 B-Street.	89-2 ✓
LAB NO.	90-27216	90-27217	90-27218
SAMPLE IDENTIFICATION	140101-564	140101-565	140101-566
SAMPLE SUBMITTED	09/28/90	09/28/90	09/28/90
DATE REPORTED	10/15/90	10/15/90	10/15/90
SAMPLE DATE	09/26/90	09/26/90	09/26/90
SAMPLE TIME	1230	1230	1430
CONSTITUENT	ug/l	ug/l	ug/l
Dichlorodifluoromethane	<1.0	<1.0	<1.0
Chloromethane	<1.0	<1.0	<1.0
Vinyl chloride	<0.50	<0.50	<0.50
Bromomethane	<1.0	<1.0	<1.0
Chloroethane	<1.0	<1.0	<1.0
Trichlorofluoromethane	<1.0	<1.0	<1.0
1,1-Dichloroethene	<0.50	<0.50	<0.50
Methylene Chloride	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0
2,2-Dichloropropane	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	<1.0
Bromochloromethane	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	<0.50	<0.50	<0.50
Carbon Tetrachloride	<0.50	<0.50	<0.50
1,1-Dichloropropene	<1.0	<1.0	<1.0
Benzene	<0.50	<0.50	<0.50
1,2-Dichloroethane	<0.50	<0.50	<0.50
Trichloroethene	<0.50	<0.50	<0.50
1,2-Dichloropropane	<1.0	<1.0	<1.0
Bromodichloromethane	<1.0	<1.0	<1.0
Dibromomethane	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0
Tetrachloroethene	<0.50	<0.50	<0.50
1,3-Dichloropropane	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0
1,2-Dibromoethane	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0
1,1,1,2-Tetrachloroethane	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0
p-Xylene	<1.0	<1.0	<1.0
m-Xylene	<1.0	<1.0	<1.0

ENVIROCON
PO BOX 8243
MISSOULA MT 59807

Water Analysis

PROJECT: Livingston/BN

PAGE 2

	B-Street	B-Street	G-1-2
LAB NO.	90-27216	90-27217	90-27218
SAMPLE IDENTIFICATION	140101-564	140101-565	140101-566
SAMPLE SUBMITTED	09/28/90	09/28/90	09/28/90
DATE REPORTED	10/15/90	10/15/90	10/15/90
SAMPLE DATE	09/26/90	09/26/90	09/26/90
SAMPLE TIME	1230	1230	1430
CONSTITUENT	ug/l	ug/l	ug/l
o-Xylene	<1.0	<1.0	<1.0
Styrene	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0
Isopropylbenzene	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0
1,2,3-Trichloropropane	<1.0	<1.0	<1.0
n-Propylbenzene	<1.0	<1.0	<1.0
2-Chlorotoluene	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0
4-Chlorotoluene	<1.0	<1.0	<1.0
tert-Butylbenzene	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0
sec-Butylbenzene	<1.0	<1.0	<1.0
p-Isopropyltoluene	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	<0.50	<0.50
n-Butylbenzene	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0
1,2-Dibromo-3-Chloropropane	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene	<1.0	<1.0	<1.0
Hexachlorobutadiene	<1.0	<1.0	<1.0
Naphthalene	<1.0	<1.0	<1.0
1,2,3-Trichlorobenzene	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0

REMARKS: Sample was properly preserved and in specified container. Sample was analyzed in accordance with EPA method 524.2.

Q.A. Review: ______________

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ENVIROCON
PO BOX 8243
MISSOULA MT 59807

Water Analysis

PROJECT: Livingston / BN

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	Trip Blank	LG-10	Equipment Blank
LAB NO.	90-27213	90-27214	90-27215*
SAMPLE IDENTIFICATION	140101-561	140101-562	140101-563
SAMPLE SUBMITTED	09/28/90	09/28/90	09/28/90
DATE REPORTED	10/15/90	10/15/90	10/15/90
SAMPLE DATE	09/26/90	09/26/90	09/26/90
SAMPLE TIME	1015	1200	1131
CONSTITUENT	ug/l	ug/l	ug/l
Dichlorodifluoromethane	<1.0	<1.0	<1.0
Chloromethane	<1.0	<1.0	<1.0
Vinyl chloride	<0.50	<0.50	<0.50
Bromomethane	<1.0	<1.0	<1.0
Chloroethane	<1.0	<1.0	<1.0
Trichlorofluoromethane	<1.0	<1.0	<1.0
1,1-Dichloroethene	<0.50	<0.50	<0.50
Methylene Chloride	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0
2,2-Dichloropropane	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	8.4
Bromochloromethane	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	<0.50	<0.50	<0.50
Carbon Tetrachloride	<0.50	<0.50	<0.50
1,1-Dichloropropene	<1.0	<1.0	<1.0
Benzene	<0.50	<0.50	<0.50
1,2-Dichloroethane	<0.50	<0.50	<0.50
Trichloroethene	<0.50	<0.50	<0.50
1,2-Dichloropropane	<1.0	<1.0	<1.0
Bromodichloromethane	<1.0	<1.0	<1.0
Dibromomethane	<1.0	<1.0	<1.0
Toluene	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0	<1.0
Tetrachloroethene	<0.50	<0.50	<0.50
1,3-Dichloropropane	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0
1,2-Dibromoethane	<1.0	<1.0	<1.0
Chlorobenzene	<1.0	<1.0	<1.0
1,1,1,2-Tetrachloroethane	<1.0	<1.0	<1.0
Ethylbenzene	<1.0	<1.0	<1.0
p-Xylene	<1.0	<1.0	<1.0
m-Xylene	<1.0	<1.0	<1.0

*Sample contained a large amount of methanol

ENVIROCON
PO BOX 8243
MISSOULA MT 59807

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OCT 17 1990

ENVIROCON, Inc.
Livingston, Mt.

Water Analysis

PROJECT: Livingston/BN

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	Trip Blank	LG-10	Equipment Blank
LAB NO.	90-27213	90-27214	90-27215*
SAMPLE IDENTIFICATION	140101-561	140101-562	140101-563
SAMPLE SUBMITTED	09/28/90	09/28/90	09/28/90
DATE REPORTED	10/15/90	10/15/90	10/15/90
SAMPLE DATE	09/26/90	09/26/90	09/26/90
SAMPLE TIME	1015	1200	1131
CONSTITUENT	ug/l	ug/l	ug/l
o-Xylene	<1.0	<1.0	<1.0
Styrene	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0
Isopropylbenzene	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0
Bromobenzene	<1.0	<1.0	<1.0
1,2,3-Trichloropropane	<1.0	<1.0	<1.0
n-Propylbenzene	<1.0	<1.0	<1.0
2-Chlorotoluene	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	<1.0	<1.0	<1.0
4-Chlorotoluene	<1.0	<1.0	<1.0
tert-Butylbenzene	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	<1.0	<1.0	<1.0
sec-Butylbenzene	<1.0	<1.0	<1.0
p-Isopropyltoluene	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	<0.50	<0.50
n-Butylbenzene	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0
1,2-Dibromo-3-Chloropropane	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene	<1.0	<1.0	<1.0
Hexachlorobutadiene	<1.0	<1.0	<1.0
Naphthalene	<1.0	<1.0	<1.0
1,2,3-Trichlorobenzene	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0

REMARKS: Sample was properly preserved and in specified container. Sample was analyzed in accordance with EPA method 524.2.

*Sample contained a large amount of methanol.

Q.A. Review:

ENERGY LABORATORIES

ENERGY LABORATORIES, INC.

P.O. BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325
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WATER SUPPLY QUALITY CONTROL SAMPLE

This Quality Control sample was analyzed with your Lab Nos. 90-27213-20 with the following results.

Volatile Organic Contaminants

Parameter	Test Value, ug/l	P (%)	Range for P (%)
1,1-Dichloroethene	5.0	88	60-140
Methylene Chloride	5.0	79	60-140
trans 1,2-Dichloroethene	5.0	90	60-140
cis 1,2-Dichloroethene	5.0	87	60-140
Bromodichloromethane	5.0	108	60-140
Dibromochloromethane	5.0	119	60-140

P = Percent recovery measured.

Q.A. Review: ______________________

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WATER VOLATILE SURROGATE RECOVERY

PROJECT: Livingston/BN

SAMPLE NO.	S1 (TOL)#	S2 (BFB)#	S3 (DCE)#
90-27213	102	104	87
90-27214	94	98	90
90-27215	108	118	92
90-27216	111	109	111
90-27217	93	100	105
90-27218	111	106	95
90-27219	109	102	90
90-27220	113	104	90

	QC LIMITS
S1 (TOL) = Toluene-d8	(80-120)
S2 (BFB) = Bromofluorobenzene	(80-120)
S3 (DCE) = 1,2-Dichloroethane-d4	(80-120)

Column to be used to flag recovery values with an asterisk

* Values outside of contract required QC limits

Q.A. Review: ______________________

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Quality Assurance-Spiked Analysis

Lab No. 90-27221 was spiked with the following constituents with these results.

Constituent	Spike Amount ug/l	P (%)	Range for P (%)
1,1-Dichloroethene	5.0	116	60-140
Trichloroethene	5.0	117	60-140
Chlorobenzene	5.0	114	60-140

P = Percent recovery measured.

Q.A. Review: ______________________